Required Courses for TSM Qualification

LANL'S IT/MIS Coursework Standards

Area	Coursework	Required	Semester Hours	Desired
		48	**48**	**6**
Information Systems	**Upper Division Courses to Include:**		30	
	Data Structures	3		
	Computer Organization and Architecture	3		
	Computer Operating Systems	3		
	Data Base Systems	3		
	Software Engineering	3		
	Computer Security Concepts	3		
	Advanced Data Base Systems	3		
	Programming Languages	6		
	Systems Analysis/Design [1]	3		
	[1] *Not currently offered @ UNM, but LANL staff are willing to teach this course.*			
Information Systems Environment	**Contemporary Issues in Computer Science (Computer Science Ethics)**	3	3	
Mathematics	Calculus I	3	6	
	Calculus II	3		
Statistics	Introduction to Statistics	3	3	
Science	**<u>One year</u> of science where courses could include the following:**		6	
	Introduction to Physics	3		
	A First Course in Chemistry	3		
Desired Courses	**Advanced Course in Statistics**			3
	A First Course in Probability			3
	Logic Structures			

Programming Languages: Course that teaches student to become proficient in two modern programming languages such as C++, JAVA, Cobol, or Pascal.

Systems Analysis/Design A study of the analysis phase of the software life cycle through the use of CASE tools and structured analysis.

Information Systems Required Core Courses

Data Structures: Intro to abstract data types, linear lists, linked lists, stacks, queues, graphs, and trees; method for implementing, and algorithms for manipulating these types; dynamic memory methods; additional searching and sorting algorithms that result from using these data types; sequential file processing; application of these concepts in the lab to provide further experience in the program design process.

Computer Organization and Architecture: Analysis and design of methods used by operating systems to perform typical system services; design and implementation of file and directory systems; I/O methods, including programmed, interrupt-driven, and DMA; CPU scheduling; memory management techniques and implementations; concurrent programming; deadlocks; protection mechanisms; distributed systems; and lab component focuses on implementation of several designs and algorithms.

Computer Operating Systems: Analysis and design of methods used by operating systems to perform typical system services; design and implementation of file and directory systems; I/O methods, including programmed, interrupt-driven, and DMA; CPU scheduling; memory management techniques and implementations; concurrent programming; deadlocks; protection mechanisms, distributed systems; lab component focusing on implementation of several designs and algorithms.

Database Systems: Study of database design and implementation; comparison of basic models (entity-relationship, hierarchical, network, object oriented); study of query languages; discussion of issues of integrity, security, dependencies, and normal norms.

Software Engineering: Current topics in development of software systems; software life cycle model, requirements definition, design, verification and validation, and project management techniques.

Computer Security Concepts: Cryptographic systems, coding and decoding of messages; network, database, and operating system security issues, capability and access-control mechanisms; current trends and research in mandatory and discretionary security policies.

Advanced Database Systems: Theory, analysis, and implementation of database architecture, security performance, query optimization, recovery and concurrency control, reliability, integrity, commit protocols, distributed processing, deadlock detection and management.

Information Systems Business Perspective

Contemporary Issues in Computer Science: Ethical, legal, and intellectual property issues; current research topics; and other issues of important to the professional computer scientist.

Mathematics

Calculus I: Functions and their graphs, differentiation of polynomial, rational and trigonometric functions; velocity and acceleration; geometric applications of the derivative, minimization and maximization problems, the indefinite integral, and an introduction to differential equations; the definite integral and the Fundamental Theorem of Calculus.

Calculus II: Geometric applications of the integral, logarithmic, and exponential functions, techniques of integration, conic sections, improper integrals, numerical approximation techniques, infinite series and power series expansions, differential equations (continued).

Introduction to Statistics: An introduction to basic probability theory, sampling from normal populations, large-sample problems, sampling from one or two populations, estimation, and testing. SAS is used to perform statistical analyses.

Science (Introductory courses to Physics, Geology, Chemistry)

Elementary Physics: Non-rigorous survey of physical phenomena where topics include mechanics, wave motion, energy, light, nuclear and atomic physics, and astrophysics.

***Intro to Geology*:** Structure and composition of the Earth and the processes that shape it, deduced from geological observation and measurement; applications of this knowledge to locating and characterizing energy and mineral resources, and to identifying and mitigating geological hazards.

Elementary Chemistry: Broad introduction to Chemistry that includes general chemistry with an emphasis on the language of chemistry and quantitative problem-solving; topics in introductory organic chemistry.

Additional Desired Courses

Advanced Course in Statistics: Quantitative reasoning through an introduction to the design of experiments, multiple regression, factorial and nested designs.

A First Course in Probability: Combinatorial problems, random variables, distributions, independence and dependence, conditional probability, expected value and moments, law of large numbers, and central-limit theorems.

Logic Structures Content may be included as an introductory topic in ***Systems Analysis/Design***.